THE LIFE HISTORY OF *SERROPALPUS COXALIS*, WITH A DESCRIPTION OF THE LARVA AND PUPA (COLEOPTERA: MELANDRYIDAE)

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Abstract

Larvae and pupae of *Serropalpus coxalis* Mank were found in the sound wood of a felled hemlock, *Tsuga canadensis* (Pinaceae). The larvae excavate tunnels in the wood. Pupation occurs in cells in the wood close to the surface. An ichneumonid, *Odontocolon canadense* [Hymenoptera: Ichneumonidae: Xoridinae], is a parasite of larvae. Host records of 2 other species of *Serropalpus, S. barbatus* and *S. substriatus,* are listed. Larval and pupal stages of *S. coxalis* are described and illustrated.

The literature on the bionomics of the immature stages of the Melandryidae is scant. The habits of those species that are known are varied; some are found in dry, seasoned wood, some under bark, some in decayed logs usually associated with wood-decaying fungi, some in dry shelf fungi, and some in tree stumps (Peterson 1951, Blatchley 1910).

The major groups comprising the Melandryidae (*sensu* Arnett 1968) are more or less ecologically defineable. The adults of the Tetratominae[1], with only few exceptions, are small, oval, convex forms that live in dry woody fungi and beneath the bark or in the rotton wood of fungus-covered logs (Blatchley 1910). The larvae are usually found in the same habitats. Adult and larval habits and a number of fungus habitats of several British tetratomid species have been discussed in some detail by Crowson (1963) and Paviour-Smith (1964). Hayashi (1972) recorded larval habitats for several tetratomid species occurring in Japan. The Melandryinae include members whose larvae are found either under the bark of deciduous trees, or boring in sound timber. In the Scraptiinae[2], the larvae of some species have been taken in decayed forest litter (Peterson 1951), or in rotton wood and fungi. Adults of species of *Osphya,* the only genus comprising the Osphyinae, have been found frequenting foliage and flowers, especially of *Crataegus* (Blatchley 1910). Larvae of some European species of *Osphya* occur in the dead wood and under the bark of various deciduous trees, and in rotting tree stumps (Viedma 1965). The habits and ecology of the Anaspidinae[3] are not well known. The larvae of *Anaspis* occur under loose bark and in crevices of decaying wood (Crowson 1955).

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[1]Crowson (1955) considers this subfamily to be a separate family, the Tetratomidae, as do many other authors.

[2]Crowson (1955) separates the Scraptiinae from the Melandryidae and forms the family Scraptiidae.

[3]Crowson (1955) includes the Mordellidae-Anaspidini in the family Scraptiidae. Arnett (1968) includes the Anaspidini as a subfamily of the Melandryidae.

Mank (1939) made a review of the genus *Serropalpus* and concluded that the North American fauna includes 3 species, *S. substriatus* Haldeman, *S. obsoletus* Haldeman, and *S. coxalis* Mank. In an earlier treatment of the genus by Seidlitz (1898), 3 species were regarded as distinct in America, namely *S. barbatus* Schaller, *S. substriatus,* and *S. obsoletus.* Mank has shown that *barbatus* does not occur in North America; specimens called *S. barbatus* from North America should (probably) be called *S. substriatus.*

Life History and Habits

Serropalpus coxalis larvae were found tunneling in the sound wood of a felled hemlock, *Tsuga canadensis* (L.) Carr, on the Cornell University campus in Ithaca, New York (Tompkins County) (Fig. 1). The tunnels were relatively shallow, with a maximum depth of about 3 cm below the surface. The tree in which the larvae were found was believed to have been cut down 2 years earlier, and the infested wood was very dry and solid with no signs of dead rot. The log was 3 meters long and 0.5 meter in diameter. Over 200 adult specimens were removed from this log. As the beetle is a northern species that has been recorded from Alaska to New Jersey (Mank 1939), presumably conifers other than hemlock are attacked because the tree does not occur throughout the beetle's range.

The larvae usually bore parallel to the surface at 0.8 cm below the wood-bark interface (Fig. 2). Pupae were frequently found at this depth, and the emerging adults have to gnaw through the wood and bark to reach the surface.

Adult beetles were collected from the hemlock log on 9 June and 13 June, 1975, and larvae and pupae were taken on 14 June, 1975. Intermittent observations were made during the first few weeks of June, until the activity and numbers of the adults subsided (25 June, 1975). During the daylight hours, the beetles were quiescent and refused to fly and would run or drop when disturbed; they appeared to become active at twilight. During the early evening, copulating pairs were occasionally found on the surface of the bark. The capture of specimens attracted to "black light" at Ithaca and other localities in Tompkins County confirms the crepuscular and nocturnal habits of the beetles.

Mank (1939), from the specimens she examined when she first described the species, found the size of the adults to range from 6.0-13.0 mm. Measurements were made from 199 specimens that we collected, and the range in size was found to be 4.8-14.4 mm, with a mean length of 10.8 mm. The length was measured from the anterior margin of the head to the apex of the elytra. The females average larger than the males. Females ranged in size from 4.8-14.4 mm (mean 11.01 mm, $n=90$), males from 4.8-13.6 mm (mean 9.84 mm, $n=109$).

Other species of *Serropalpus* are similar in host preferences. All known larval host plants are coniferous. Norway spruce, *Picea abies,* is recorded in the literature as a host of the European *Serropalpus barbatus* (Viedma 1965). Bletchley (1955) also listed silver fir (*Abies alba*) and an unidentified species of fir as hosts of *S. barbatus.* All other records are associated with *Serropalpus substriatus* and western North America. Specimens of *S. substriatus* in the Cornell University collection were found with the following host information: subalpine fir, *Abies lasiocarpa*; engelmann

spruce, *Picea engelmannii*; lodgepole pine, *Pinus contorta*; western white pine, *Pinus monticola*; and ponderosa pine, *Pinus ponderosa*.

Figs. 1-2, Habitat of *Serropalpus coxalis*: 1, Trunk of host tree, *Tsuga canadensis*; 2, Mature larva of *S. coxalis* and larval mines in hemlock.

Male and female parasites, identified as the xoridine ichneumonid, *Odontocolon canadense* (Provancher), were apparently parasitizing the larvae of *S. coxalis*. Many male parasites were observed frequenting the hemlock log, but female parasites were rare and only one was collected. The parasites were first collected on 21 May, 1975. They were abundant on 14 June, 1975, and the feamle was taken at that time. One beetle larva was found with an external parasite larva on it. presumably that of *Odontocolon canadense*. The shallow tunnels of the beetle larvae made attack by the parasite possible. The ovipositor of the parasite is approximately 15 mm long, more than adequate to reach the typically 10 mm deep burrows of the beetle larvae even if bark intervenes. The other recorded host for this parasite is a species of *Tetropium* (Coleoptera: Cerambycidae) (Muesebeck *et al* 1951:207). Other species of *Odontocolon* parasitize wood-boring beetle larvae also (Townes & Townes 1960:449).

Dexcription of the Mature Larva of *Serropalpus Coxalis*

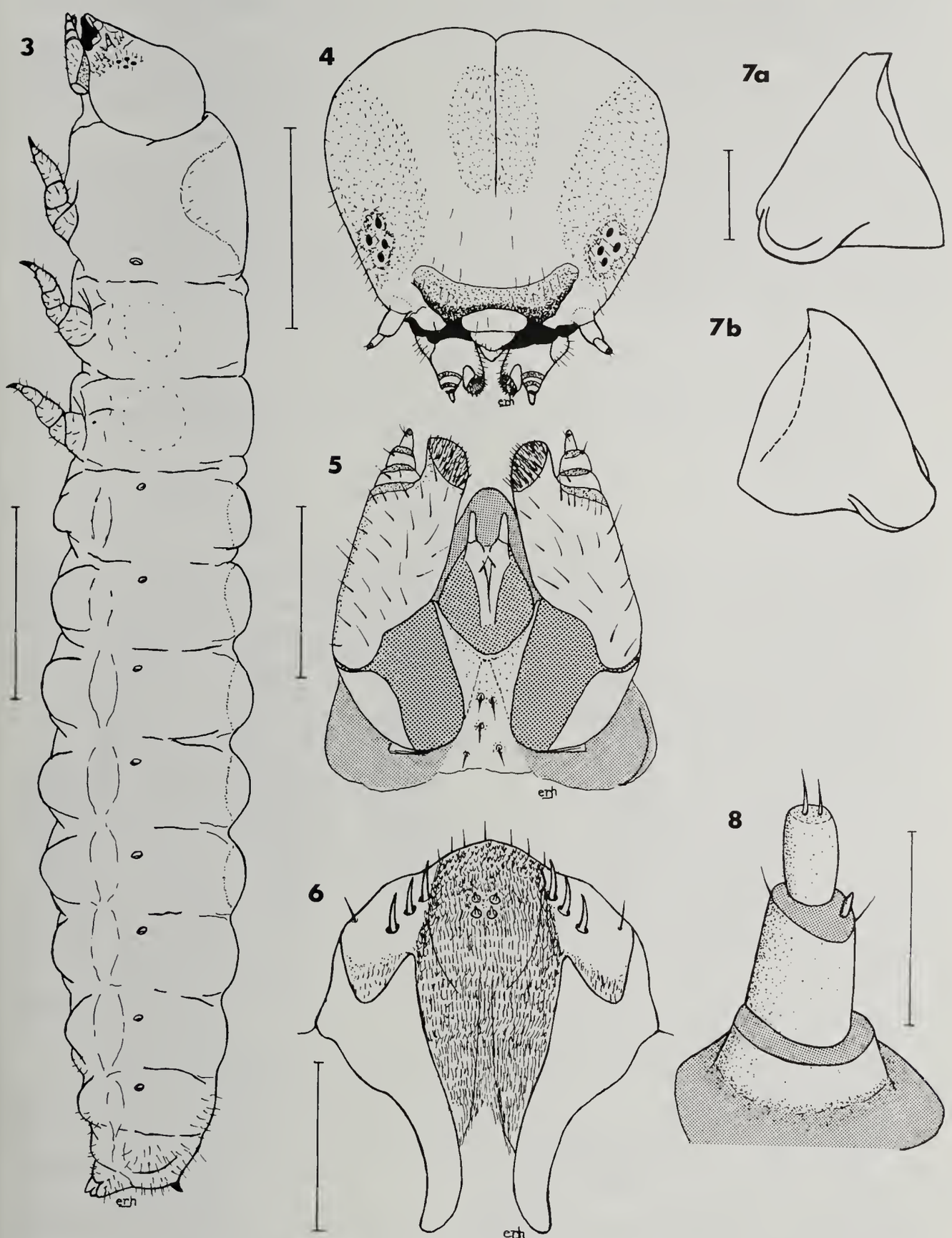
Measurements. 15.0-20.0 mm long; 3.0-4.0 mm wide; orthosomatic, cylindrical (Fig. 3); body near white with numerous scattered setae; head yellow-brown with dark markings above clypeus and along lateral aspects.

Head. Large, exserted, prognathous, slightly depressed from front, rounded, dorsal hind margin almost straight, possessing coronal suture, with distinct endocarina, "Y arms" lacking (fig. 4); 2 pairs of ocelli posterior of each antennal fossa; antennae (Fig. 8) extremely small, arising between base of mandibles and ocellar patch, 3-segmented; first segment short, transverse; second segment cylindrical, slightly longer than first; sensory appendage of second segment very small; third segment small with few stout apical setae; clypeus broadly transverse; labrum semicircular, somewhat produced along anterior margin; epipharynx (fig. 6) with posterior rods somewhat elongate, with a row of 3 prominent setae along each side of anterior part of midline, and with 4 sensory sensillae in center of disk; frons broadly emarginate along anterior margin; mandibles (fig. 7) prominent, deeply sclerotized and pigmented, robust, blunt, basal part without molar structure; maxilla (fig. 5) somewhat protracted with single, conspicuous, subtriangular to quadrate cardo, a large, fused stipes clothed with setae, and an entire setiferous mala; palpus 3-segmented, tapering to end, segments decreasing in width to end, terminal segment small, almost acicular; articulating membrane present between cardo, stipes, and postmentum; labium (fig. 5) with distal prementum bearing small, 2-segmented palpi, and a proximally fused mentum and submentum; ligula projecting beyond apex of labial palpi, devoid of setae.

Thorax. Prothorax slightly longer and larger than mesothorax and metathorax combined, with inconspicuous, lightly sclerotized dorsal shield, and weakly sclerotized ventral "breastplate"; legs comparatively small; tibia nearly subequal to femur in length; claw slender with 2 setae; prothoracic spiracle unicameral, oval, conspicuous; lateral fleshy swellings present on mesothorax and metathorax.

Abdomen. Distinct fleshy swellings on lateral ventral aspects of segments 1 through 8; lateral longitudinal folds also present on segments 1 through 8; segment 9 (Fig. 3) with 2 short, sharp-pointed, slightly curved, sclerotized, caudal, dorsal, projecting hooks or urogomphi; spiracles annular to oval, conspicuous, without chambers on margin.

Specimens examined. Nine mature larvae, Ithaca, Tompkins County, New York, 14 June, 1975, from *Tsuga canadensis* log, E. R. Hoebeke and T. L. McCabe, collectors. Determined by association with reared adults.



Figs. 3-8, Larva of *Serropalpus coxalis:* 3, mature larva; 4, frontal, dorsal aspect of head; 5, maxilla and labium, ventral; 6, epipharynx; 7, mandibles, (a) ventral, right mandible and (b) ventral, left mandible; 8, antenna. [scale line = 3.0 mm for Fig. 3; 1.0 mm for Fig. 4; 0.5 mm for Fig. 5; 0.15 mm for Fig. 6; 0.25 mm for Fig. 7; and 0.1 mm for Fig. 8].

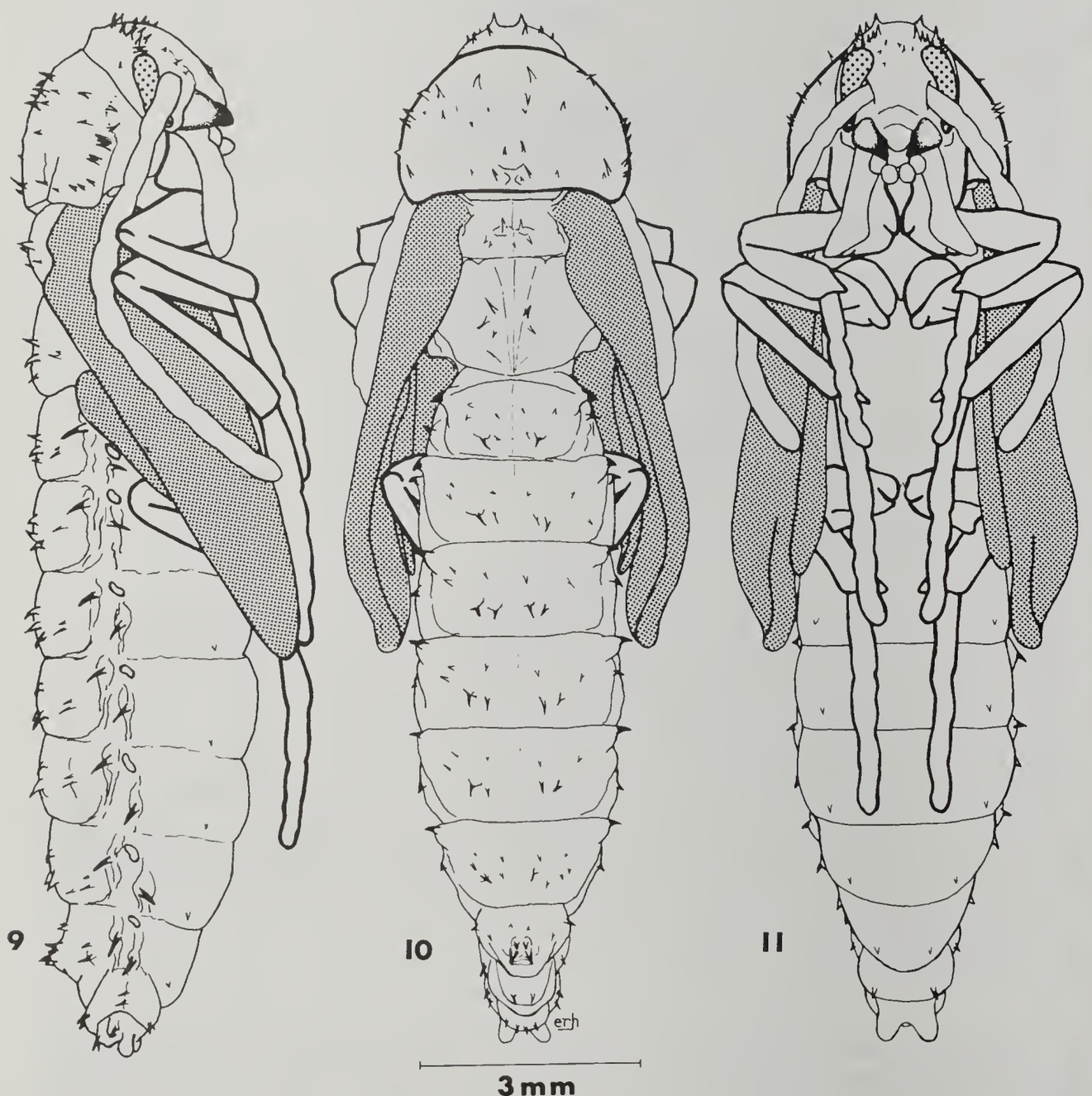
Description of the Pupa of *Serropalpus coxalis*

Measurements. 13.0-15.0 mm long; 3.0-4.0 mm wide; color whitish; exarate.

Head. Size moderate, partially covered above by hood-shaped pronotal disk, ornamented with sclerotized, irregular tubercles above posterior margin of eyes to vertex (Figs. 9 and 11).

Thorax. Prothorax large, hood-shaped, slightly shorter than combined length of mesothorax and metathorax; prothoracic disk with irregular tubercles, most prominent near lateral margins; mesothorax with conspicuous spines on dorsum; metathorax large with dorsal spines.

Abdomen. Segments 1 through 7 each bearing 2 major lateral tubercles on each side, 1 above spiracle and 1 on same level and behind spiracle (=pleural tubercle) (Fig. 9); segment 1 with pleural tubercle approximate to spiracle; segments 2 through 7 with pleural tubercles distant from spiracles; tergites 1 through 6 clothed with irregular curved spines (Fig. 10); tergite 7 small, with 2 pairs of large tubercles on fleshy swelling



Figs. 9-11, Pupa of *Serropalpus coxalis*: 9, lateral aspect; 10, dorsal aspect; 11, ventral aspect.

of caudal aspect of segment (Figs. 9 and 10); tergite 8 small, with 1 caudal spine on each side of midline; tergite 9 inconspicuous with caudal spines; small, inconspicuous spines on lateral caudal aspects of all sternites (Figs. 9 and 11).

Specimens examined. Twelve pupae, collected in Ithaca, Tompkins County, New York, 14 June, 1975, from log of *Tsuga canadensis,* E. R. Hoebeke and T. L. McCabe, collectors. Determined by association with reared adults.

Acknowledgments

We wish to thank T. J. Spilman (Department of Entomology, U. S. National Museum) and J. L. Lawrence (Museum of Comparative Zoology, Harvard University) for valuable suggestions in preparation of the manuscript. In addition we wish to thank J. G. Franclemont and L. L. Pechuman, Cornell University, for helpful criticism of the manuscript. H. K. Townes, American Entomological Institute, Ann Arbor, Michigan, is acknowledged for verifying our determination of the ichneumonid parasite. G. A. Goldberg is commended for alerting us of the location of the log from which the beetles and parasites were collected. We also wish to express our appreciation to John E. Rawlins for the habitat photographs presented here.

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